

# Electroconvulsive therapy

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# INTRODUCTION

# DEFINITION:

- It is a treatment in which a grandmal seizure is artificially induced in an anaesthetized patient by passing on electrical current through electrodes applied to the patients head.

# TYPES OF ECT

- **A) According to technique:**
  - **Direct ECT**
  - **Modified ECT**
- **B) According to placement of electrodes**
  - **Bilateral**
  - **Unilateral**

# INDICATION

- **1) Depression**

- Major severe depression especially with **suicidal** risk with psychiatric features like delusions or hallucinations
- Depressive stupor
- Puerperal depression and postpartum psychosis
- Poor intake of food and fluids
- Where the speedier recovery needed
- In elderly patient
- Depression with physical illness
- Schizo affective depression

# Conti...

- **2) Obsession or compulsion**
- **3) Schizophrenia**
  - Catatonic schizophrenia and catatonic stupor
  - Acute schizophrenic episode
  - Intolerance to other treatment
  - First trimester of pregnancy
  - Schizophrenia with depression

# Conti...

- **4) Mania**

- Excreted of un-cooperation behavior
- Bipolar mood disorder with rapid cycle
- Bipolar and disorder with mixed behavior
- Mania in the first trimester of pregnancy

# Contraindications of ECT

- Increased intracranial pressure, including tumors, hematomas, and subarachnoid hemorrhage
- Acute myocardial infarction
- Hypertension
- Cardiac disease, aneurysm, thrombophlebitis, bleeding disorders or where there is increased risk of embolism



# Conti...

- CVA
- Severe pulmonary disease such as pneumonia and TB
- Others are fracture, dehydration, fever, glaucoma, retinal detachment, CCF, and contraindicated for anesthesia

# Side effects

- Deaths during ECT are due to general anaesthesia.
- Headache and body ache
- Memory disturbance than bilateral ECTs
- Confusion may occur in the postictal period
- Vomiting due to increased ICP

## Conti...

- Memory lost from a day or a month due to hypoxia of the brain
- Thoracic spine or long bones fracture
- Dislocation of shoulder joint and wrist
- Arrhythmia, aspiration, pneumonia, status epilepticus
- Muscle pain, nausea

# Method/Technique

- ECT can be given by a direct and indirect method
- The patient is administered atropine sulphate subcutaneously 0.6 mgm to 1.0 mgm, half an hour before the treatment or IV immediately before the treatment.
- Minor Tranquillizer like Calmpose is also used

## Conti...

- A grand mal seizure is induced in the patient by passing an electric current through the temporal lobe.
- Atropine prolongs the period of disorientation after the seizures
- It also reduces vomiting.
- Immediately after the ECT treatment appropriate resuscitative and other emergency management equipment and supplies are kept ready.

# Modified ECT

- Electroconvulsive therapy is modified with the use of Anesthesia, muscle relaxation and oxygenation.
- The use of anesthesia is necessary to allay anxiety and achieve the maximum effect.
- It is used to modify the force of convulsion and to avoid complications like bone fractures.
- Modified ECT is also used for the patients who are recovering from heart conditions.

## Conti...

- A short acting Barbiturate, methohexial sodium (Brevital sodium) or Theopental (pentothal) 5 ml to 10 mg (1 ml = 10 mgm) and ultra short acting depolarizing agent succinylcholine 0.3 ml to 0.5 ml (1 ml = 20 mgm) are given intravenously.

# *Observation of production of seizure*

- The production of grand mal seizure is necessary for direct and modified ECT.
- In direct ECT, the Tonic phase that is muscle contractions last for 10 seconds
- The clonic phase that is movement or convulsion lasts for 25 to 30 seconds
- Then the patient goes into the relaxation phase



## Conti...

- With the use of anaesthesia in modified ECT, mild grimace or blepharo-spasm, (a tonic spasm of the eyelid muscles) is observed when the current is applied.
- There is a slow planter flexion (reverse Babinski) during the tonic phase and there are fine movements of the toes during the clonic phase.

## *Number and frequency of ECT treatment*

- There is no clinical justification for a fixed number of treatments.
- Peak response is attained between five and ten treatments for patients with bipolar disorders, manic type, schizoaffective disorders, or catatonic schizophrenia.
- Twenty to 25 treatments may be required for chronically ill schizophrenic patients.

## Conti...

- ECT treatment is most often given three times a week.
- The frequency of treatment can be reduced if the patient shows a severe confusional state.
- With an extremely agitated, psychotic or suicidal patient it may be useful to give the first few treatments on a daily basis.
- ECT does not prevent relapse. So maintenance treatment should be with drug and psychotherapy.

## *Mode of action*

- Changes in behaviour due to ECT are attributed to an acute amnesic change in the patient.
- Many patients who are getting ECT, seem to forget what had been bothering them during the depressive episode.
- Biological mechanism by which a therapeutic effect has been brought about by ECT includes
  - Neuro-chemical, Neuro-endocrine and Neuro-physiological.

## Conti...

- **Neuro-chemical** investigations have shown that the role of catecholaminergic effect is due to pre-synaptic and postsynaptic receptor effect and may not be due to neurotransmission.
- This effect is also achieved due to seizures caused by ECT treatment.

## Conti...

- **Neuro-physiological** effect due to ECT is achieved probably due to cerebral hypometabolic state.
- **Neuro-endocrine** changes have effects on depressive illnesses. Polypeptides from the hypothalamus change the neuro-endocrine activity which affects thalamocortical pathways.

# The axioms or widely accepted theoretical concepts are:

- The persistent behavioural or therapeutic effect i.e., changes in the CNS are due to repeated ECT seizures and not changes in the peripheral or visceral component.
- Repeated seizures alter many brain functions like in psychotic state, perception recall, concentration, memory and orientation as well.
- Improvement in behaviour (clinical remission) is characterized by a gain in weight, increased appetite, increased duration of sleep, increased libido, and increased interest in the environment.

# *Complications*

- Impairment of memory may vary from mild tendency to forget names to a severe confusion.
- To start with, the patient has a tendency to forget all types of events but gradually it limits to the events just before the ECT treatment
- This causes disturbance to the patient and is relatives. They should be explained that these changes are temporary.



## Conti...

- The memory returns fully within a few weeks to a month.
- However, the learning capacity of the patient improves, though there is impairment of retention in memory function.

# *Fractures and dislocations*

- Most frequently the fracture and dislocation are caused by muscular contraction due to ECT.
- Compression fracture of vertebrae of dorsal area between the second and eighth-usually, fourth and fifth vertebrae is common.
- Fracture of femur and humerus occurs in young muscular individuals. There may be complete rupture between head and shaft of femur due to right restraints applied during the convulsion phase.

## Conti...

- Impacted fractures are more frequent in elderly people.
- Dislocation of jaw is the most frequent complication of the tonic phase. It can be totally prevented by supporting the jaw or applying pressure on the chin upward.

# *Complications in the respiratory system*

- Apnea is a physiological phenomenon in any epileptic seizure.
- Airway should be kept clear by use of metal airway.
- Prevent collection of saliva in the mouth by suction.
- Turn the head to one side.
- Oxygen therapy for a short duration

## Conti...

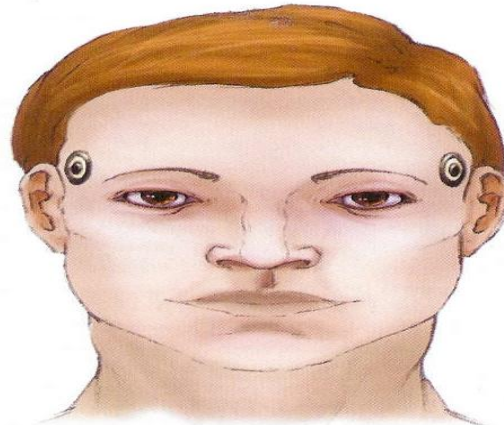
- However, if apnea is prolonged, artificial respiration should be applied.
- To reduce the effect of barbiturates, Coramine 1 mgm to 2.5 gm should be given intravenously.
- Neurological and cardiac complications are very rare. Thorough physical examination is required prior to the ECT treatment.

## *Other complaints of patient due to ECT*

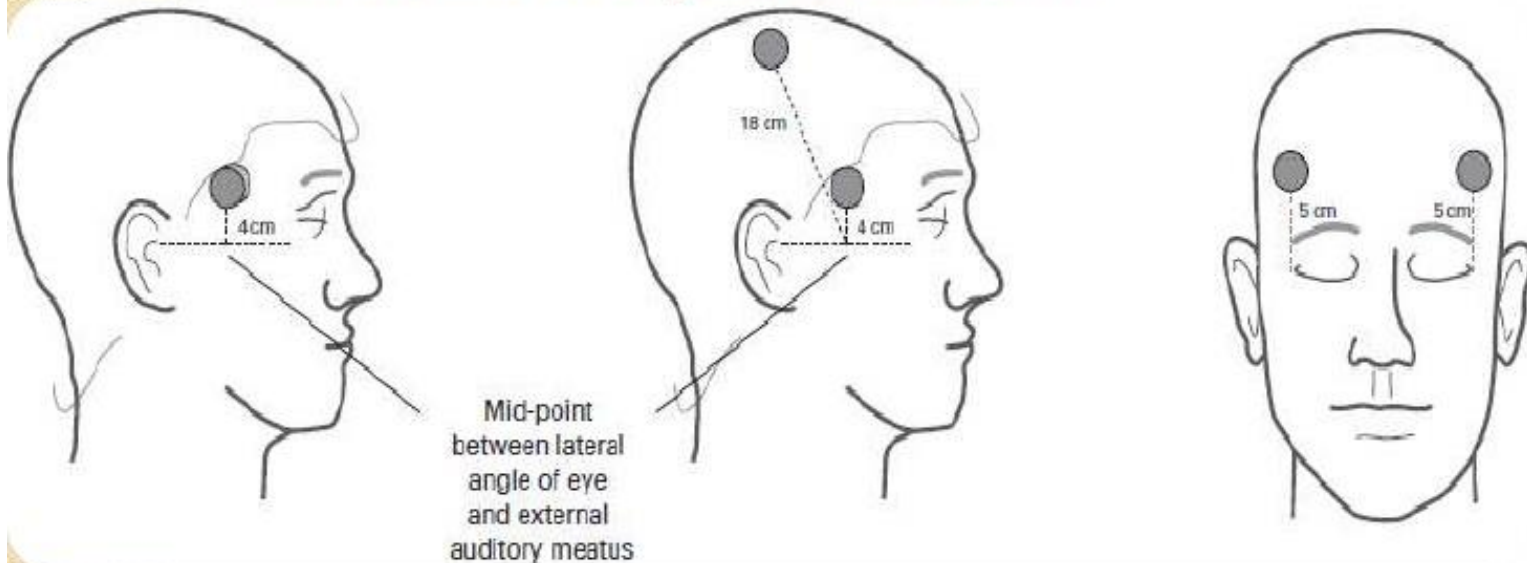
- Headache, backache, painful mastication, injury to mouth and tongue.
- Fear due to an unpleasant experience on waking up after the treatment.
- These complications can be prevented by observation and early intervention by nursing care.

# Placement of electrodes

- ▣ Bilateral ECT
  - This is standard form of electro convulsive therapy used most commonly. Each electrode is placed 2.5 – 40 cm above the midpoint on a line joining the tragus of the ear and the lateral canthus of the eye.



# Electrode placement



**BT**

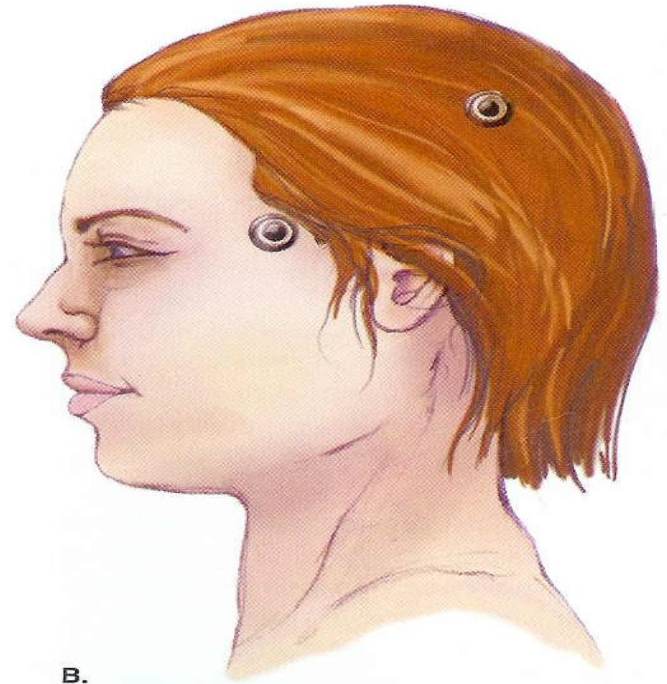
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# Unilateral electro convulsive Therapy

- Here the electrodes are placed only on one side of head, usually the non dominant side, In the right handed.



# Voltage

- Standard dose according to American Psychiatric association, 1978:
  - Voltage 70-120 volts.
  - Duration 0.7 – 1.5 seconds



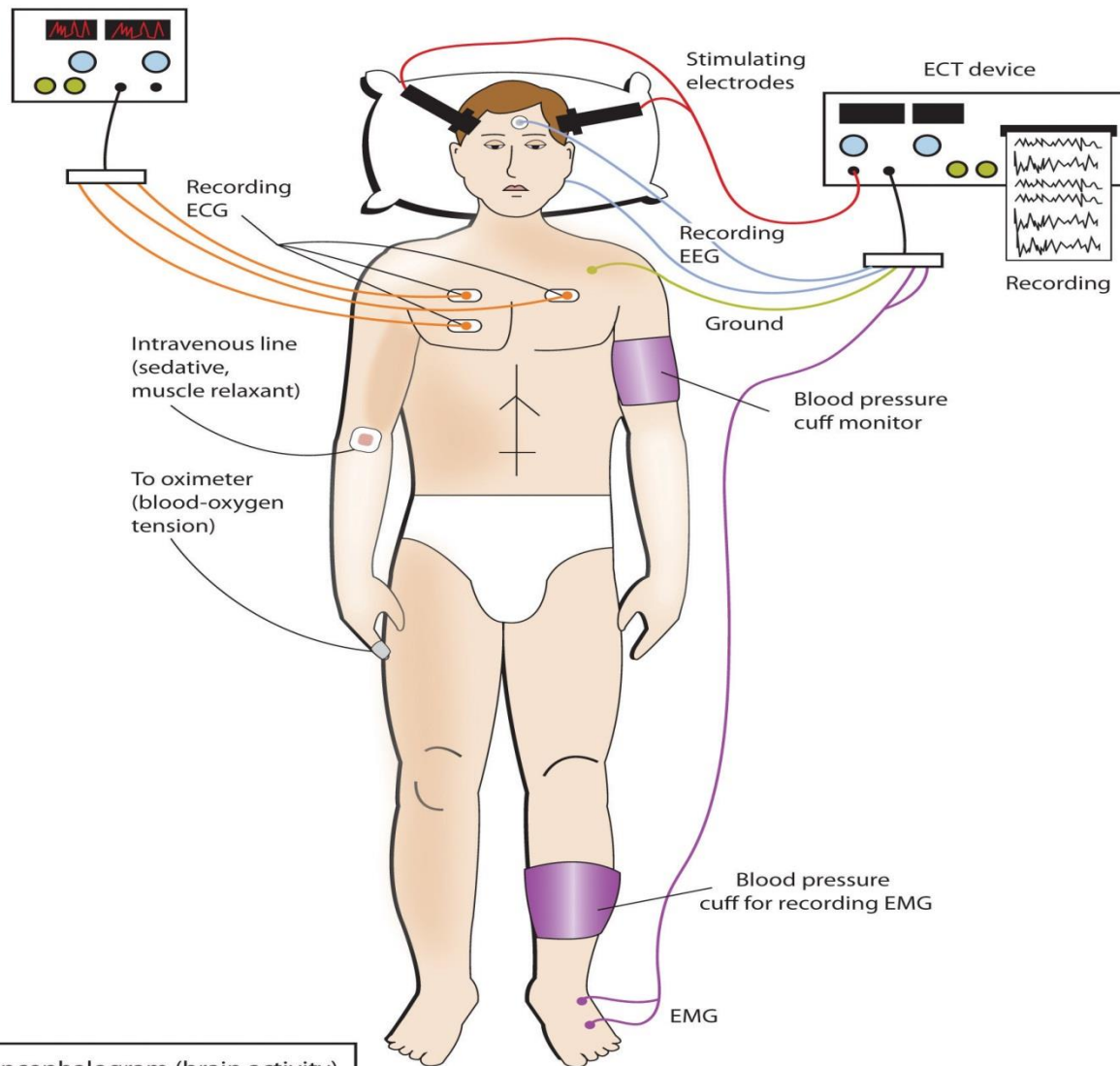
# Types of Seizures produced

- Grandma seizure – tonic phase lasting for 10-15 seconds
- Clonic phase lasting for 30-60 seconds
- **ECT team**
  - It consists of psychiatrist, anesthetists, psychiatric nurse, nursing aids, and ECT assistants.



# *Articles*

- Anaesthesia applicant
- Suction apparatus
- Face mask
- O2 cylinder
- Tongue depressant
- Mouth gag
- Resuscitation apparatus
- Full set of emergency drug
- Defibrillator
- ECT drug
- Well equipped recovery room



EEG, electroencephalogram (brain activity)  
 ECG, electrocardiogram (heart rate)  
 EMG, electromyogram (muscle activity)

# Preparation for ECT

- Consent of the patient and relatives
- Pre-medications
- Check previous findings of ECT
- Routine investigation and physical examination
- Results for re-ECT
- Explain procedure to the patient, its level of - understanding



## Conti...

- Psychosocial evaluation of memory
- Communicate the positive feeling of ECT
- Ensure the patient is NPO at least 6 hours before the procedure
- Discourage cigarette smoking just before the procedure to avoid increased deficiency on managing pulmonary secretion.
- Remove dentures, eye glasses, jewellery, contact lenses.
- Loosen the clothing

## Conti...

- Empty bowel and bladder
- Monitor vital signs
- Make sure that ET tube and a cylinder is accessible and function in case of emergency
- Show a warm supportive attitude to recipient
- Transfer the patient to ECT with all necessary search
- Record all investigations

# During ECT

- Reassure the patient until the anesthetic effect take place
- Position the patient in a supine position
- Administer necessary drug
- Mouth gaps placed
- O<sub>2</sub> is given before and after administration of side line

## Conti...

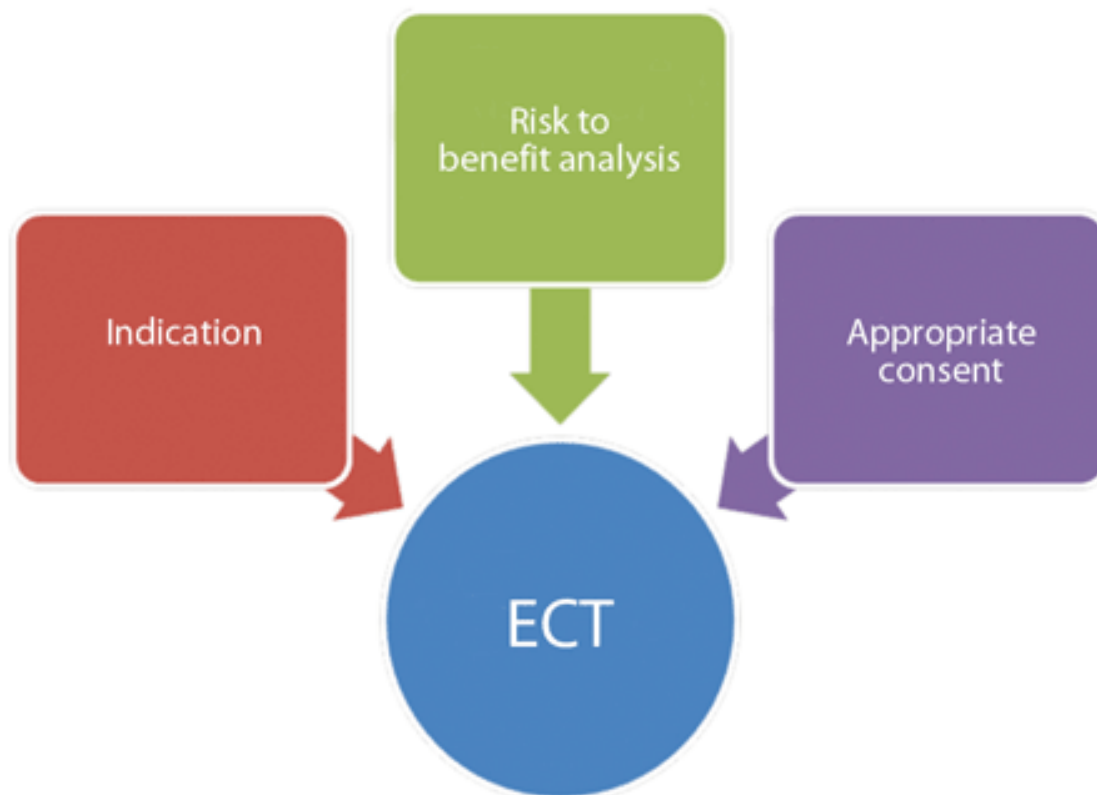
- Electrical current is applied
- One attender laced hands on both eyes, near knee point, and another attender hold the shoulder to prevent fall and fracture and dislocation
- After seizure occur, mouth gap is removed and secretions suck up O<sub>2</sub> given.

# Post ECT

- Till the consciousness is regained, patient is turned to one side to prevent aspiration.

Figure 2

## ECT decision process



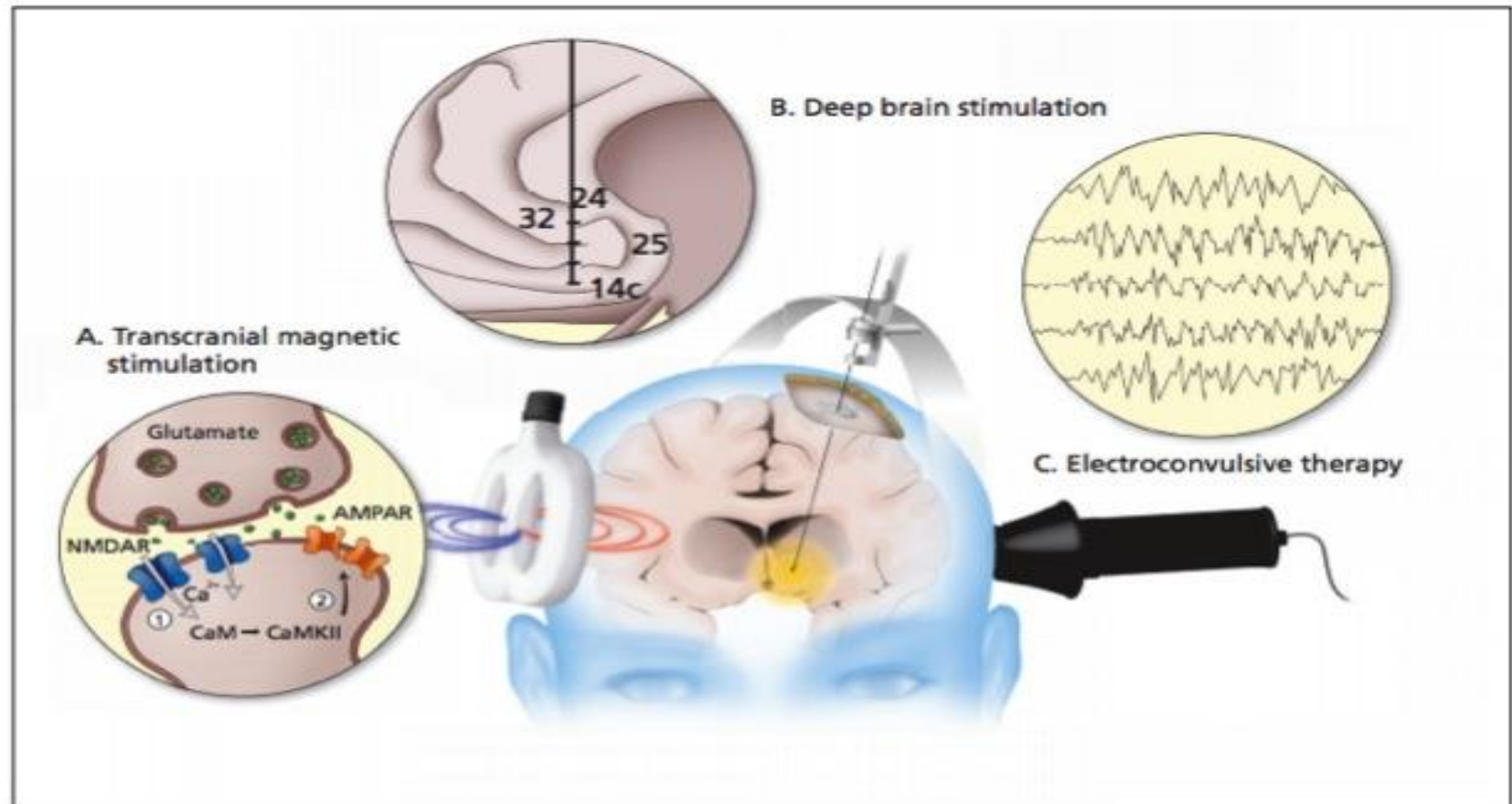


Figure 1: (A) Transcranial magnetic stimulation is thought to produce durable changes in synaptic strength via the NMDA-receptor-dependent mechanisms of long-term potentiation and long-term depression. Simultaneous stimulation of presynaptic and postsynaptic neurons strengthens or weakens the synaptic connection, depending on the frequency and pattern of stimulation. When applied to areas of prefrontal cortex that are hypoactive in depression, repetitive transcranial magnetic stimulation gradually increases their activity, thereby relieving the illness. (B) With deep brain stimulation, electrodes are inserted under stereotactic guidance into regions of the brain believed to drive maladaptive thoughts and behaviours. Constant electricity, provided by an implanted pulse generator, disrupts neural activity both at local sites (i.e., at the target) and at remote, yet connected, structures, comprising a "mood circuit." (C) Electroconvulsive therapy induces ictal activity, as shown by the electroencephalographic recording.

